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November 28, 2001

Magalie Roman Salas
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: 1998 Biennial Regulatory Review – Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices
ET Docket No. 98-42

BOSTON
DALLAS
DELAWARE
NEW YORK
SAN DIEGO
SILICON VALLEY
TWIN CITIES
WASHINGTON, DC

Dear Ms. Salas:

This is to report oral *ex parte* communications in the above-captioned proceeding and to respond to the last four ex parte filings from the DARS licensees, Sirius Satellite Radio and XM Radio, Inc. On November 27, 2001, Kent Kipling, Senior Vice President Business Development of Fusion Lighting, Inc. and Robert Ungar, Fusion counsel, met with Julius Knapp, John Reed, Karen Rackley, Bruce Romano and Hugh Van Tuyl of the Office of Engineering and Technology to discuss ex parte filings of the DARS licensees and to present new information to the staff.

In their last four *ex parte* filings in this proceeding, the DARS licensees, Sirius Radio Inc. and XM Radio Inc., make statements and admissions that are by turns, false, contradictory, *technically incorrect*, and ultimately, revealing.[1] The Commission should find these developments particularly disturbing as it seeks to balance the equities in this proceeding. Moreover, based on startling new evidence provided by Fusion *infra*, that Fusion lamps, in fact, **do not** interfere with the XM receivers recently introduced to market, the Commission should either dismiss the comments of the DARS licensees or step in and demand testing of DARS receivers under its auspices to once and for all resolve this matter.

Fusion's Lamps Will or Will Not Interfere With DARS?

May 1997 --- **"Noise sources such as microwave ovens and ISM out-of-band radiation have been analyzed and are tolerable."** - Submission and Amendment to Application of Satellite CD Radio, Inc., May 16, 1997

[1] See ex *parte* comments of July 26, August 2, November 1, and November 5, 2001.

(resubmitted as attachment to written Ex parte Presentation of Sirius and XM on August 2, 2001.)
July 1998 --- **"CD Radio's preliminary analysis shows that proliferation of RF lighting devices that merely comply with the proposed rules will severely interfere with the Satellite DARS signal received by radio users."** - Comments of Satellite CD Radio in ET Docket 98-42, July 8, 1998.

December 1998 --- **"Noise sources such as microwave ovens and ISM out-of-band radiation have been analyzed and are tolerable."** – Application of Satellite CD Radio, Inc. to Modify Authorization, December 11, 1998.

Statements that a layman, exercising common sense, would call "untruthful" are referred to in the more gentile arena of administrative law as "lacking in candor." Fusion Lighting respectfully suggests that the DARS licensees[2] have repeatedly exhibited a gross lack of candor in filings with the Commission. Normally, in the context of the licensing process, these discrepancies would call for at least an investigation.

It is difficult to interpret the quotations above in a more charitable way. Quite possibly, Sirius' license declaration to the Commission in May of 1997 might be explained away as ignorance of Fusion's existence. At best, this would indicate an abysmal failure of the due diligence required of all DARS auction bidders.[3] Regardless, once Sirius learned of the existence of Fusion lamps in this proceeding, one would expect that its subsequent 1998 declaration would have reflected its new understanding of the dangers of the RF environment. So what should the Commission make of the fact that five months after filing plaintiff comments in this proceeding about the dangers of these lamps, Sirius repeats its 1997 assertion that ISM out-of-band radiation is tolerable? One explanation is that the declarations of May 1997 and December 1998 were crafted, intentionally or otherwise, so as not to state anything that might jeopardize Sirius' pending application for a potentially valuable license of the public airwaves. Because it needed the Commission's blessing of an "aggressive" link budget that was critical to Sirius business plans, RF emissions from Fusion lamps were, therefore, alleged to be "tolerable."

One can only speculate what might have happened in May 1997, had Sirius performed better due diligence, or in December 1998, had it shown more

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[2] Although the quoted language is taken directly from critical amendments to the Sirius application, XM amendments also contain representations that ISM interference sources had been analyzed and were believed to be tolerable.

[3] Fusion's presence in the lighting field was well-documented publicly long before the DARS auction and the RF issues associated with Fusion lamps were well known to numerous Commission and NTIA officials. Even the most rudimentary due diligence efforts should have included discussions with the Commission's staff about present and future uses of the 2450 MHz band.

candor with the Commission. Both statements on tolerable ISM band radiation were made pursuant to Section 25. 114(c)(8) which requires an applicant for a space station license to provide an "overall link performance analysis (including an analysis of the effects of each contributing noise and interference source)."[4] Had Sirius confessed to the Wireless Bureau, as it clearly and forcefully did to OET in this proceeding, that Fusion lights would "severely interfere" with DARS operations based on the link budget then under review by the Commission staff, one would assume that processing of its license application might have ground to a halt and its business plans at least temporarily derailed.

Thus, there can be no escaping the fact that Sirius' own, and possibly deliberate, lack of candor in its licensing proceeding is the source of its current problems in this docket.[5] And like the proverbial defendant who, after slaying his parents, seeks the court's mercy as an orphan, Sirius cannot be rewarded for such egregious conduct.

Suddenly Revealed: There is no Interference to XM From Fusion Lamps

It is particularly outrageous that with all their prophecies of doom, the DARS licensees have never subjected one of their receivers to testing so that we might know which of their contradictory statements is true – the statement that interference is tolerable, or the statement that Fusion lights would "severely interfere" with DARS receivers. Until recently, there has been no hard data whatsoever in the record to support allegations of interference.

On July 13, 2001, in a letter from Kent Kipling, Senior Vice President of Business Development, to Phillip Barsky of XM Satellite Radio, Fusion requested a sample of a DARS receiver so it might finally perform testing. Fusion even suggested a joint testing plan. On October 5, 2001, Derek de Bastos, Senior Vice President, Space Segment of XM Radio refused the joint test proposed by Fusion, arguing that if Fusion was in the process of

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[4] XM took a different approach to the requirement of Section 25.114(c)(8). While providing the technical details of its link budget, it simply failed to mention any analysis of link performance and provided no information about interference sources – implying either that such analysis had been performed and interference was not a problem or that XM had no idea about the matter.

[5] Given the link budget data provided by the DARS licensees, Fusion has assumed that there might be some level of interference, possibly significant, that would impact DARS operations. Based on the information Fusion provides below, there is every possibility that in at least some of its statements to the Commission Sirius was telling the truth, and out-of-band emissions from ISM devices are tolerable. Under these circumstances, the Commission should move quickly to terminate this portion of the proceeding forthwith, or at least conduct formal testing of the DARS receivers.

redesigning its lights, there was little reason to engage in testing.[6] Never mind that during the entire course of this proceeding, the DARS licensees have predicted dire consequences from the out-of-band emissions from the lights Fusion had already marketed. And never mind that there was no similar reticence to offer the Commission continuing predictions of doom based on the measurements of six such lights on November 6, 2000 - without receivers which were said to be unavailable. One can only conclude that XM's reason for refusing to jointly test its receivers for susceptibility to RF lighting interference is simply not credible.

Having failed in its attempt to obtain agreement on a joint testing program, Fusion has gone ahead on its own. Since XM radios are now being marketed, Fusion simply bought one and, at its offices in Rockville, MD, placed it squarely in the beam of each of two of the Fusion lamps that were the subject of joint testing with DARS in November 2000. The results of the tests are attached and are dramatic: the XM receiver worked perfectly well at a distance of three feet beyond one lamp and six feet beyond the other – not 6000 feet or 600 feet, or even 60 feet, but 6 feet. Fusion did not perform any detailed field strength measurements nor did it re-analyze XM's link budget analysis -- it merely listened to the XM radio and the signal was clear as could be. Only when the antenna of the XM receiver was moved within 6 feet of the "worst case" lamp, a distance not likely to ever to be experienced in the real world, was there any sign of interference. Similarly, no interference from a microwave oven was discernable until the antenna was moved directly next to the door seal. The Commission and XM are invited to repeat these tests.[7] Indeed, Fusion believes the Commission should oversee a similar test, including a test of Sirius receivers, inviting all parties to participate and witness the results.

Various explanations may be put forth to account for the results of the experiment performed by Fusion. One possibility is that XM may have installed a terrestrial repeater near Fusion's headquarters in Rockville. Even with a terrestrial repeater, however, previous warnings from the DARS

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[6] In their most recent *ex parte* filing, the DARS licensees have the gall to claim that "Fusion's inability to provide new production models for testing is further evidence that Fusion's business is stalled." Fusion's business is not stalled. Indeed, as stated elsewhere in the record of this proceeding Fusion has invested tens of millions of dollars to date and is continuing to invest considerable sums in improving its 2.45GHz lighting product line. In the meantime, for three years Fusion has been subjected to constant attacks on its product. In fact, the DARS licensees have openly threatened to shut down the operation of Fusion's lamps. In the midst of such uncertainty it is simply foolish to imagine that Fusion would undertake an aggressive marketing program and an exercise of remarkable audacity to accuse Fusion of having a stalled business for not doing so.

[7] Sirius' system is transmitting and has been tested for months all over the country by Sirius. It is not operating commercially yet, so no Sirius receiver could be obtained by Fusion, but one can certainly be procured by the Commission.

licensees would seem to suggest that interference would certainly still occur at a few feet away from a Fusion light. Another explanation, perhaps more likely, is that the broadband white noise emitted by the Fusion lights simply do not affect the DARS receivers as predicted. Indeed, at the November 27 meeting, Mr. Reed suggested that this may be a case where the pure mathematics of signal propagation do not tell the whole story and that the tested XM receiver may be designed to receive the carefully modulated DARS signal but is relatively insensitive to Fusion's lights.

More to the point, it is difficult to imagine why neither of the DARS licensees has run the same type of experiment that could have easily been performed by driving up next to the Fusion lamp installation at the Department of Energy in Washington DC – an installation that the DARS licensees previously tested for interference and presented to the Commission. Surely, they must already know what Fusion has just recently discovered. There is little or no threat of interference, at least to XM from RF lighting and, if XM can withstand emissions from Fusion's lights, then Sirius' system can be expected to operate successfully as well. Perhaps this is the real reason that the DARS licensees refused joint testing with Fusion of an XM receiver and raises again, the gnawing question of candor.

So what has this proceeding been about? It appears that all the pontificating about link budgets and receiver sensitivity has been false; all the time spent by the parties and the Commission's staff largely wasted; and a proceeding that could have been concluded long ago is still burdening Fusion for the fourth year in a row. In the process of prosecuting what now appear to be false charges against Fusion lamps, the DARS licensees have preyed upon the Commission's concerns for its auction program by uttering solemn predictions that their business for which they paid millions of dollars might be at risk. In fact, however, the only business put at risk has been Fusion's, thanks to distortions by the DARS licensees.

Perpetuating Myths

In their recent ex parte filings, the DARS licensees perpetuate three myths, which they have spun relentlessly since this proceeding first began:

Myth No.1 - Fusion cannot lawfully market its lamps until the Commission adopts RF lighting limits above 1000 MHz in this proceeding; and

Myth No.2 - Section 302 of the Communications Act obligates the Commission to protect DARS operations from all sources of interference.

Myth No. 3 – Fusion can easily and practically re-design its lights to avoid out-of-band interference.

As far back as 1998, in response to comments filed by the DARS licensees that the instant proceeding was necessary "to permit the authorization of" RF lights at 2450 MHz, Fusion made it clear that the existing Part 18 rules had long permitted the authorization and marketing of its magnetron-based lamps.

> "What CD Radio and XM fail to understand, however, is that the Fusion lamp has already been tested and verified to the Part 18 limits for sale in the U.S. with the limits in Section 18.305 "voluntarily" applied to out-of-band emissions." - Reply Comments of Fusion Lighting in ET Docket 98-42, August 24, 1998.

Notwithstanding, the DARS licensees continued to repeat their self-serving myth to the Commission and to others that the purpose of the instant proceeding was to permit the introduction of Fusion's lamps thereby implying that such lamps could not lawfully be marketed until the proceeding was completed.[8] Again, Fusion attempted to set the record straight:

> "Sirius fails to recognize that RF lighting lawfully operates in the ISM band pursuant to current Part 18 regulations." Ex parte filing of Fusion Lighting in ET Docket 98-42, July 26, 2000

Finally, in an effort to remove any doubt whatsoever as to the legality of its RF lamps, Fusion submitted an *ex parte* filing on May 31, 2001 and attached a memo from a Commission laboratory engineer documenting the successful compliance testing of a Fusion lamp (well under the Part 18 limits) that had been submitted to the FCC Labs under a formal sample request from the Commission in 1996!

Yet, in their August 2, 2001 filing, the DARS licensees re-state Myth No.1:

> "Further, unlike the LMS service – which was licensed after the Part 15 devices were authorized – the DARS service was licensed before the FCC even

[8] See *ex parte* comments of Sirius June 23, 2000 and September 5, 2000.

> initiated this proceeding to allow the operation of RF lighting devices at 2450 MHz." (emphasis supplied)[9]

And they restate it again in their joint November 5, 2001 filing, when they refer to the development of "rules for the licensing of RF lighting."(emphasis supplied)

One has to wonder for whose ears this myth is intended. Certainly not the Commission or its staff, which knows full well that Fusion lamps may be marketed even if this proceeding never ends. Then what target audience is there? Fusion submits that audience can only be the investment community without whose support the huge sums required to build and launch the DARS satellites could not have been amassed. In SEC filings, for instance, Sirius and XM have stated that the purpose of this proceeding is to "allow" new lighting devices.[10] In other words, here was something new, one could not reasonably have been expected to know about it, but there was no immediate threat because the Commission had not yet allowed the devices to be marketed.

Hand in hand with the myth that Fusion would have to await the result of this proceeding to market its lights, has been the myth spun by the DARS licensees that the Commission is bound to protect their operations from any and all interference. In short, these licensees are telling the Commission, the public and their investors that Fusion cannot sell its RF lamps now and when it can the FCC cannot allow any interference to DARS service.

In their August 2, 2001 filing, the DARS licensees make a truly outrageous assertion – Myth No. 2 - that Section 302 of the Communications Act "directs the Commission to regulate devices that emit electromagnetic energy on frequencies within the radio frequency spectrum in order to prevent harmful interference to authorized radio communications services." Section 302 does no such thing. Rather it says the Commission "may, consistent with the public interest, convenience and necessity, make reasonable regulations ... governing the interference potential of devices...."

We are not talking here about the often, arcane distinction between "will" and "shall." This is not the material for a law school examination: the statute says the Commission **may**, not must. It is empowering the Commission,

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[9] If they had any lingering doubt, the DARS licensees could have asked the Commission staff. Instead it seems that it was more convenient to perpetuate the myth that no lights could be sold until this proceeding was terminated. In addition, it appears that their argument is that because DARS licenses were granted before Fusion was authorized to market its lights, Fusion is not entitled to a safe harbor. Since Fusion was authorized years before the DARS licenses were granted, this argument fails and presumably the DARS licensees would agree that a safe harbor is warranted

[10] See respective Form 10Ks for March 2000 filed with the United States Securities and Exchange Commission.

not directing it. And since the Commission clearly understands the law and the peculiarity of the DARS licensees' interpretation of it, to whom could Myth No.2 possibly be intended? Again, the inevitable answer must be those investors who, having been told Fusion can't sell its lights, need also to be reassured that the proceeding will have a desirable outcome because the law says it must.[11]

What the recent filings demonstrate is that the DARS licensees seem willing to say whatever to whomever to get what they want. On their license applications they stated that their link budgets were sufficient to render out-of-band emissions from ISM devices "tolerable" in order to satisfy staff review. In this proceeding, and in SEC filings, they have claimed that Fusion had no market authorization and that the Commission is required to protect their systems, no matter to what degree, in order to assure the investment community that their multi-billion dollar market cap on licensed services that cost a mere $80 million each is not at risk. And to make it appear that the level of protection they seek is perfectly ordinary, the DARS licensees claim that they operate "in a fashion similar to any mobile satellite service...relying on link margins comparable to those for ... other existing MSS services." Another myth. In this very proceeding, in more than one filing, the Globalstar interests told the Commission that their MSS system can accept **in band** emissions from Fusion lamps at the Class A level – 10dB above the limit proposed in this proceeding for DARS! All of which merely confirms the fact that some MSS services (and link budgets) are more robust than others.

Old Wine, New Bottles: A Rehash of Technical Engineering

Having disclosed the dirty laundry of prior misstatements to the Commission, and having offered their own idealized version of the Communications Act and the Commissions Rules, the DARS licensees, in their most recent filing, have now resorted to their earlier assertions – Myth No. 3 - that, in some facile manner, Fusion can redesign its lights to reduce out-of-band emissions. They offer the statements of Dr. John M. Osepchuk for the proposition that there are "inexpensive and practical methods that Fusion could employ to redesign its magnetron to reduce dramatically interference into adjacent channel services such as SDARS."[12] Of course, Dr. Osepchuk's carefully worded statement hardly goes this far. Deriving his comments largely

[11] Indeed, in their filing of August 2, 2001, the DARS licensees claim that the Commission must protect them from harmful interference, "regardless of the level of interference protection required by satellite DARS..." This statement is, of course, nonsense. The only requirement of Section 302 is that the Commission act reasonably. Reflection and the passage of time have not served to provide the DARS licensees with any greater understanding of the Communications Act. In their most recent filing of November 5, the DARS licensees repeat their mantra that "the FCC is legally obligated to promulgate rules that protect DARS operations..."

[12] See November 1, 2001 *ex parte* filing of Sirius and XM.

from "the literature," Dr. Osepchuk speaks to the issues of screen designs and power supply options. In suggesting the use of multiple screens, he states:

> It would appear that it should be feasible to carry out such a design for doubling or substantially increasing the leakage suppression, in dB, at 2.3 GHz and frequencies nearby. In principle, the suppression improvement may be less satisfactory at other frequencies far from 2.3 GHz. Still because practical concern centers heavily in the range of 2 to 3 GHz, the outlook is promising.
>
> There remain the questions of effect of the design modification on optical transmission and airflow. Both these parameters suffer a modest decrease in performance if the two screens are like an initial design of modest optical transmission – e.g. 80%. This possibly could be mitigated by introducing screens of higher optical transmission with a concomitant small decrease in microwave suppression. The combination, however, can still show substantial increase in total microwave suppression at least around 2.3 GHz. (Emphasis supplied)

Dr. Osepchuk also discusses the use of a half-wave doubler power supply instead of the full-wave doubler used by Fusion. He concludes, " The use of the half-wave supply vs. the full-wave supply may pose theoretical loss in magnetron life, but in practice this difference may not be as large as presumed." (Emphasis supplied).

To which Dr. Osepchuk could well have added, "Or perhaps not."

Dr. Osepchuk's careful theoretical statements have been translated by the DARS licensees into "two specific areas where different, or improved, construction should reduce RF lighting out-of-band emission levels in a practical and economic manner." (Emphasis supplied).

Fusion, with practical, not theoretical, experience in the design of microwave lighting, also has studied the impact of adding a second and even a third screen to reduce emissions. Its study clearly demonstrated that the addition of a second screen reduced the energy efficiency of the sulfur lamp by 15 lumens per watt – destroying the economic benefits of the lamp. This fact was made part of the record in this proceeding at a meeting attended by the DARS licensees and Commission staff on October 16, 2000. Subsequently,

Fusion provided both Sirius and XM a copy of Fusion's findings. A copy of this correspondence is attached.

As for the power supply issue, Dr. Osepchuk's acknowledgment that "in principle, operating life of the magnetron should be greater with the full-wave supply," is quite correct. In fact, it is this configuration of ferroresonant power supply which the magnetron manufacturers insist that Fusion use to achieve reasonable long lifetime of its lamp. Any suggestion that Fusion adopt a half-wave doubler supply to reduce the number of noise bursts at the cost of significant lamp lifetime would ensure business failure.

The DARS licensee's technical suggestions are old hat. The various methods by which Fusion might redesign its lamps to significantly reduce out-of-band emissions have been studied and discussed previously in the course of this proceeding. It should be emphasized that Fusion has not obstinately refused to adopt emission-reducing design modifications merely as a matter of principle. With all respect, there is scant satisfaction in engaging in the administrative process purely for the sake of experiencing participatory government. This Docket has lasted for three years! If Fusion had found a way to relieve the concerns of the DARS licensees (as well as in-band spectrum users), it would have done so long ago. Thus, Dr. Osepchuk's observations are of little value if one wishes to manufacture and market a lamp that actually emits light.

"The Enforcement Bureau will have its hands full ... unplugging [Fusion] lights."

The Commission should take seriously, as does Fusion, the DARS licensee's latest and ugliest threat. In their August 2, 2001 filing, they warn, "[a]nd, when interference complaints begin – and they will if Fusion's plans are implemented – the FCC's Enforcement Bureau will have its hands full tracking RF lighting purchasers and unplugging their lights."[13] Fusion could not have made a better argument for the safe harbor it has requested and now clearly deserves. Without the protection of a safe harbor, regardless of the out-of-band limits adopted, the DARS licensees have announced that they intend to **force the Commission's staff** to seek and destroy Fusion's lighting business on their behalf. There can be no equitable conclusion to this proceeding without the safe harbor and the DARS licensees have made that case in spades.

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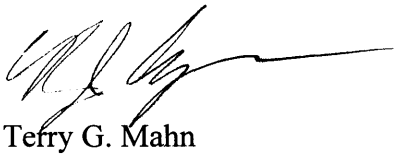
[13] With this threat, the DARS licensees at least demonstrate an understanding of the Commission's rules they did not show before – that the Commission's rules can operate to make a user of a Part 18 device cease operation in the event of interference. Strangely, but characteristically, in their November 2, meeting at the Commission, the DARS licensees reverted to an interpretation of the rules as they would have them when they "noted that, in the event of interference, the Communications Act and the FCC's Rules require Fusion to redesign its lights to mitigate this interference." Neither the Act nor the Rules require any such thing.

Conclusion

The DARS licensees are shameless. Their lack of candor is breathtaking, their myth spinning audacious but it is their bullying threat to employ the Commission's scarce resources to run Fusion lamps off the market that truly sets them apart from other users of public spectrum. And all of this for nothing as it now seems there will be no interference to DARS from Fusion lights. In the end, the DARS licensees may have made the Commission's job easier by tipping the equities in this matter decidedly in favor of Fusion.

Very truly yours,



Terry G. Mahn
Robert J. Ungar

fusionLighting

MEMORANDUM

TO: Terry Mahn, Esq.
Principal
Fish & Richardson P.C.

FROM: Kent Kipling
Sr. Vice President
Fusion Lighting, Inc.

DATE: November 26, 2001

On November 16, 2001, Fusion Lighting conducted a simple experiment to test the true RFI interaction of a 1000 watt magnetron powered lamp and a SDARS receiver.

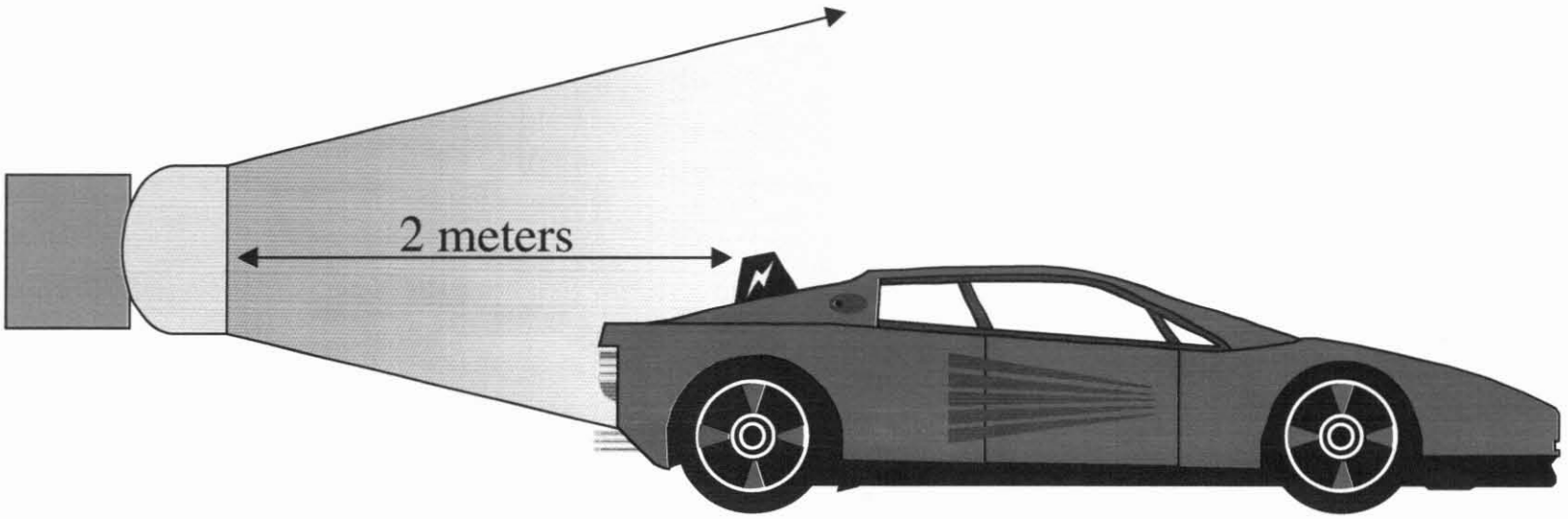
A car equipped with a Sony model DRN-XM01C XM receiver was positioned near the back loading dock of Fusion Lighting's facility at 7524 Standish Place, Rockville, Maryland. A 1000 watt sulfur lamp was placed on the loading dock. The lamp was turned on and the light beam aimed at the XM Radio antenna mounted on the trunk of the automobile. With the lamp-to-antenna distance at 3 meters, NO interference could be noted.

To further test the sensitivity of the XM receiver, the antenna was removed from the back of the automobile and brought closer to the lamp. No interference could be noted with lamp serial no. SAB1227 at distances of more than 2 meters. At a distance of 2 meters with the antenna directly in the center of the light beam, reception was lost. No interference could be noted with lamp serial no. SAB563 at a distance of more than 1 meter. At a distance of 1 meter with the antenna held directly in the center of the light beam, reception was lost.

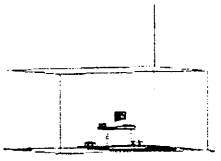
The two lamps used in this experiment had been previously tested on November 3, 2000 at PC Test Lab in Columbia, MD. This test was conducted jointly with XM Satellite Radio, Sirius Satellite Radio and Fusion Lighting and has long been part of the public record of Docket 98-42. A copy of the data taken at PC Test is attached. No modifications to the lamps, power supply or reflectors were made. These lamps had been in storage from the time of the joint testing.

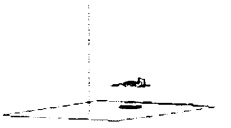
One additional test was conducted. A microwave oven was set up on the loading dock. The XM antenna was held in close proximity to the oven. When the antenna was placed next to the door seal, reception was lost. When the antenna was moved two to three inches from the door seal, radio reception was fully restored.

Beyond the testing done at Fusion, the following additional observations are of note. Driving around the Washington, DC area, one experiences occasional, apparently random, one to two second reception outtages. These outtages could not be correlated to the operation of Fusion's lamps at the U.S. Department of Energy, the Smithsonian Air and Space Museum or MCI Center. The XM receiver operated fine when the automobile was driven next to each of these sites.


2 meters

PRODUCT EVALUATION REPORT





Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators, and Industrial, Scientific and Medical (ISM) devices for compliance with the technical rules and regulations of the Federal Communications Commission.

Manufacturer:	FUSION LIGHTING, INC.
Address:	7524 Standish Place Rockville, MD 20855
Attention:	Mr. Kent Kipling – V.P. Operations
Telephone No.:	(301) 284-7200

- Trade Name(s): ***SOLAR 1000***

Model(s):	Lamp S/N:	Power Supply S/N:	REFLECTOR	BUILD DATE
DARS TEST → #1 SAB	1227	400	16"	10/97
#2 SAB	587	414	10"	9/96
DARS TEST → #3 SAB	563	315	10"	12/96
#4 SAB	06	412	10"	10/00
#5 SAB	05	415	10"	10/00
#6 SAB	04	314	10"	10/00

- EUT Type: RF Lighting – Sulphur Lamp System
- Frequency: 2.450 MHz
- Power Supply: ~~Magnatek PS 805PS1~~ PANASONIC S-6A
- Power Cord: Unshielded
- FCC Rule Part(s): FCC Part 18 – ISM Non-Consumer Device
- Test Procedure(s): MP-5
- Dates of Tests: November 3, 2000
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 18A.201102546.FLI

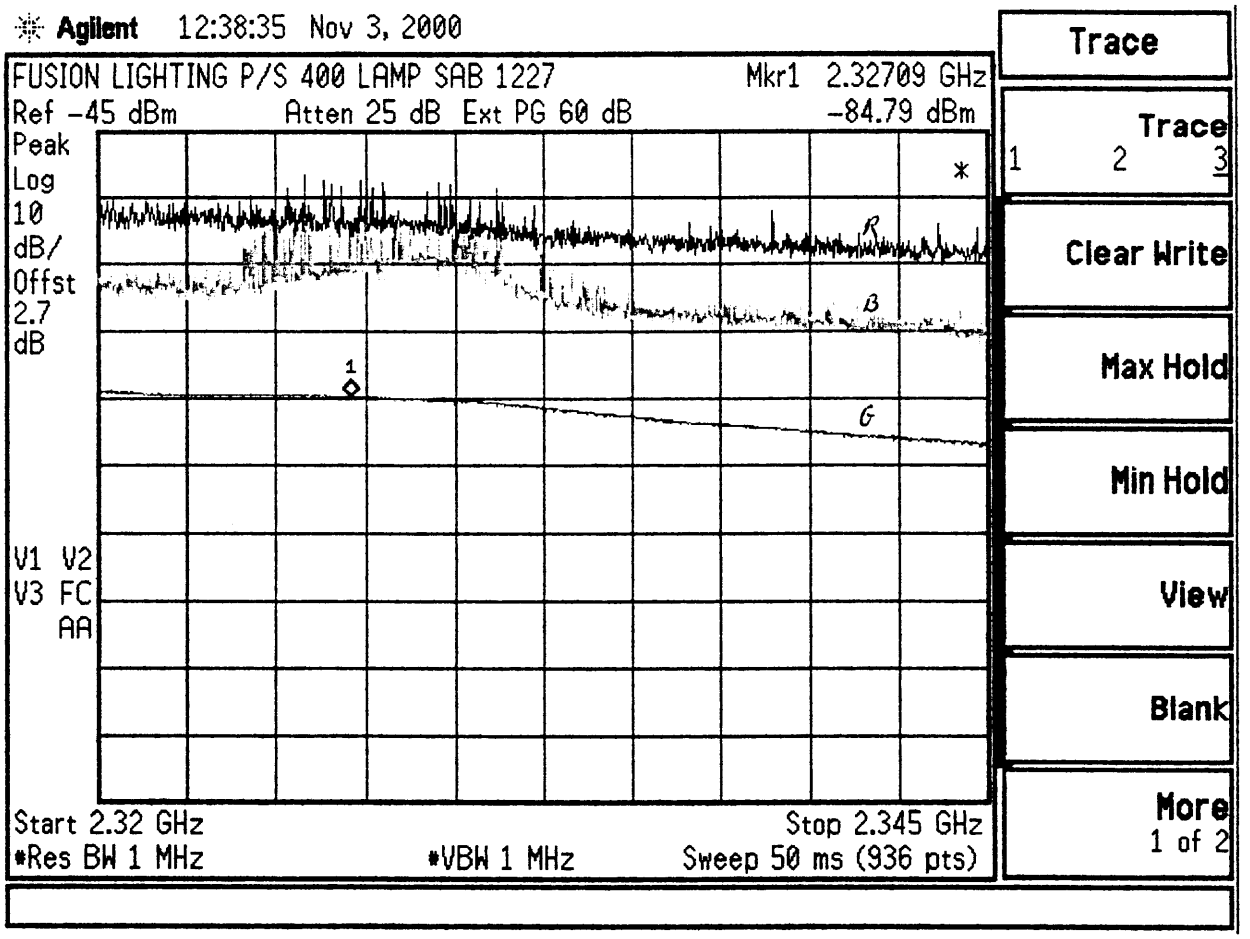
NVLAP® Lab Code 100431-0

TEST DATA

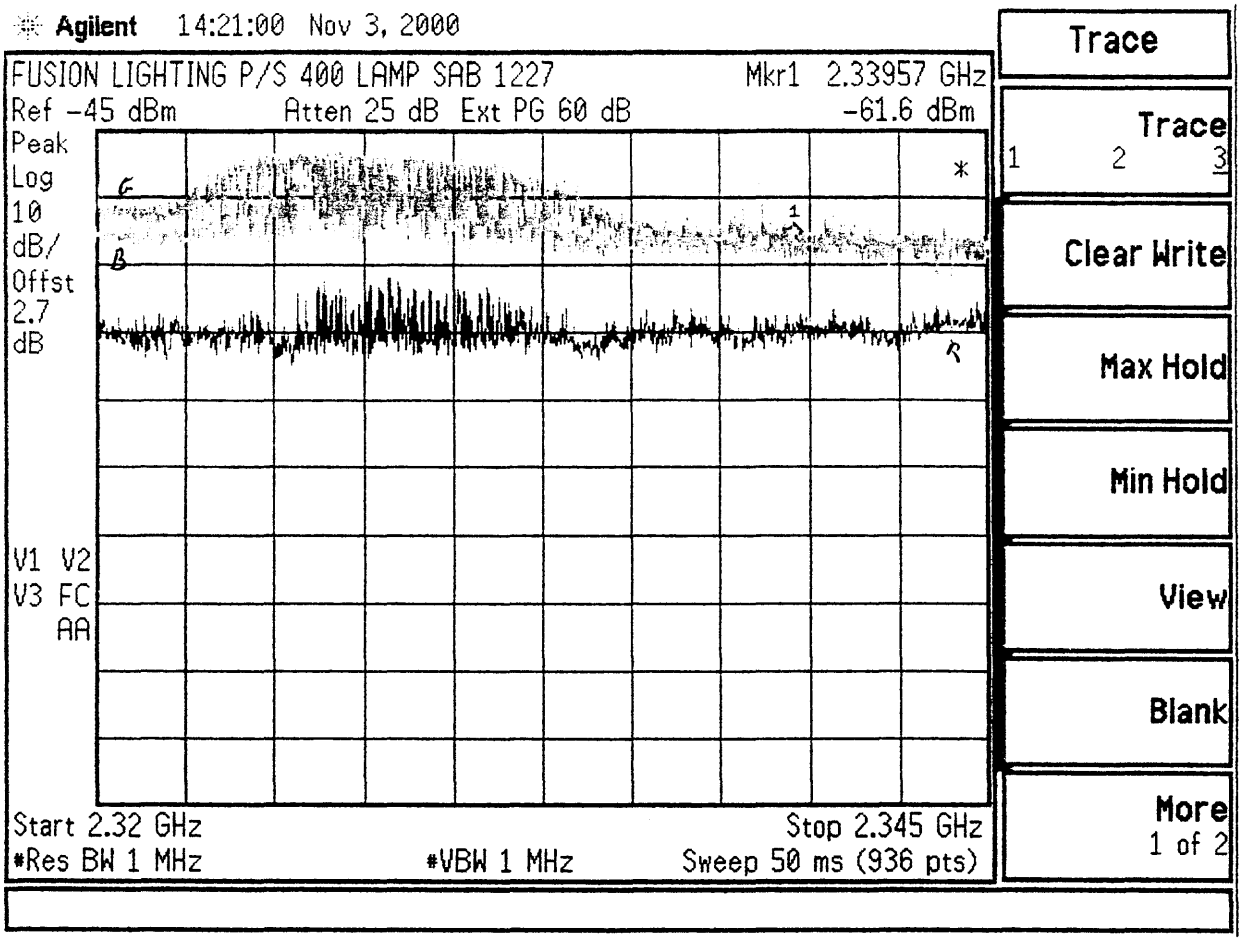
RADIATED DATA (in the band from 2320-2345 MHz)

Measurement were made inside and anechoic chamber at 3 meters to determine the emission characteristics of the EUT in the band of interest. Measurement were taken using horn antenna with spectrum analyzer RBW = 1 MHz and with VBW set at 30 Hz, 30 kHz, and 1 MHz respectfully. The worst case reading are in the table below:

Lamp SN:	Power Supply SN:	Angle degrees	Level VBW= 30 Hz	Level VBW= 30 kHZ	Level VBW= 1 MHz	AF	F/S @ 3M dBuV/M	F/S@ 30M dBuV/M	F/S @ 300M dBuV/M	FCC limit @300M dBuV/M	Margin
SAB1227	400	0	23.0			28	51.0	31.0	11.0	30.98	-20.0
SAB587	414	0	14.3			28	42.3	22.3	2.3	30.98	-28.7
SAB563	315	0	15.9			28	43.9	23.9	3.9	30.98	-27.1
SAB06	412	0	12.0			28	40.0	20.0	0.0	30.98	-31.0
SAB05	415	0	8.4			28	36.4	16.4	- 3.6	30.98	-34.6
SAB04	314	0	14.4			28	42.4	22.4	2.4	30.98	-28.6
SAB1227	400	0		50.0		28	78.0	58.0	38.0		
SAB587	414	0		42.8		28	70.8	50.8	30.8		
SAB563	315	0		20.0		28	48.0	28.0	8.0		
SAB06	412	0		27.0		28	55.0	35.0	15.0		
SAB05	415	0		26.8		28	54.8	34.8	14.8		
SAB04	314	0		40.4		28	68.4	48.4	28.4		
SAB1227	400	0			56.0	28	84.0	64.0	44.0	50.98	-7.0
SAB587	414	0			49.0	28	77.0	57.0	37.0	50.98	-14.0
SAB563	315	0			40.0	28	68.0	48.0	28.0	50.98	-23.0
SAB06	412	0			38.0	28	66.0	46.0	26.0	50.98	-25.0
SAB05	412	0			30.2	28	58.2	38.2	18.2	50.98	-32.8
SAB04	314	0			49.0	28	77.0	57.0	37.0	50.98	-14.0



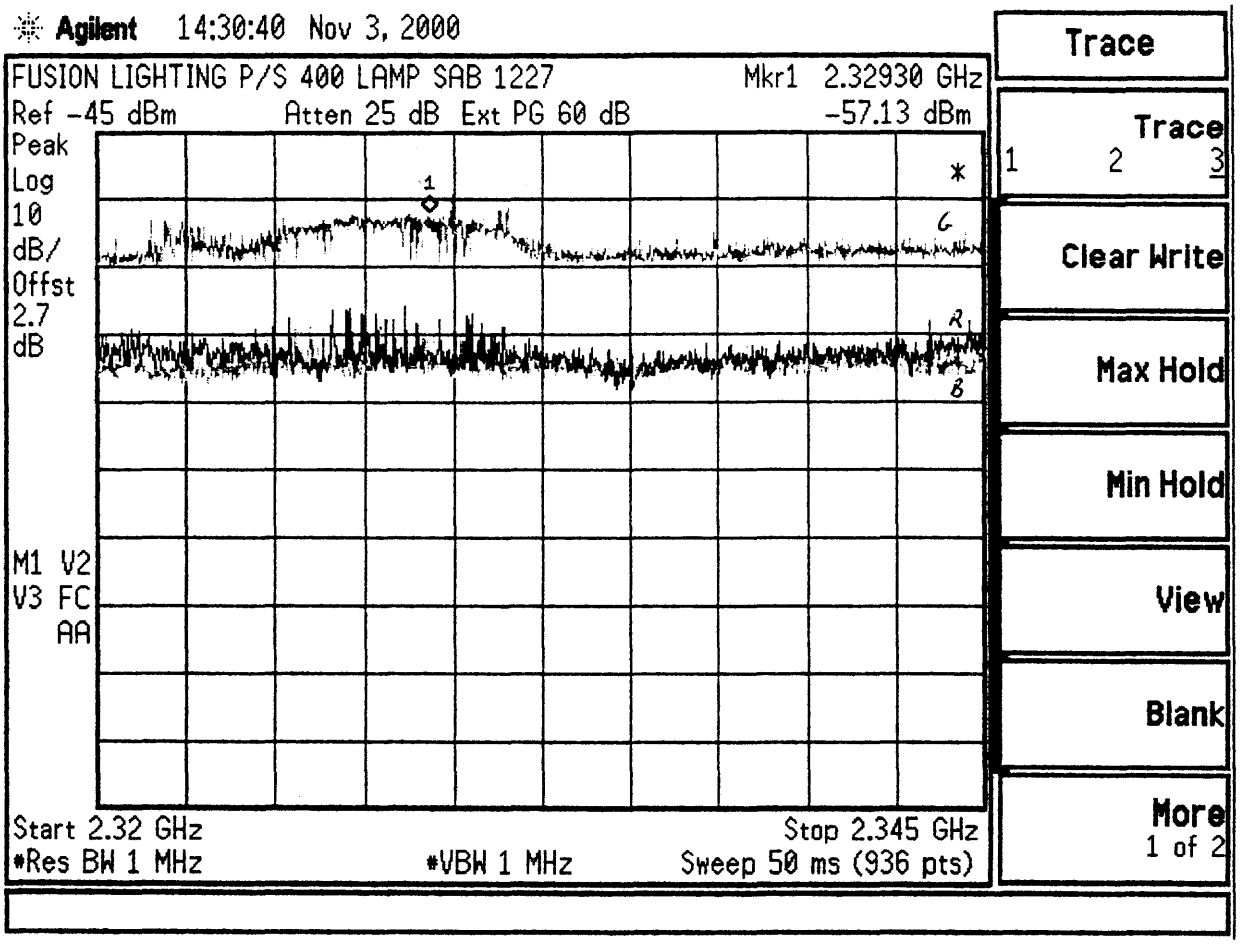
	VBW	RBW
Red	1 MHz	1 MHz
Blue	30 kHz	1 MHz
Green	30 Hz	1 MHz


Agilent 14:21:00 Nov 3, 2000
FUSION LIGHTING P/S 400 LAMP SAB 1227
Mkr1 2.33957 GHz
Ref -45 dBm
Atten 25 dB Ext PG 60 dB
-61.6 dBm
Peak
Log
10
dB/
Offst
2.7
dB
G
B
V1 V2
V3 FC
AA
Start 2.32 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 2.345 GHz
Sweep 50 ms (936 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

G 0°

B 20°

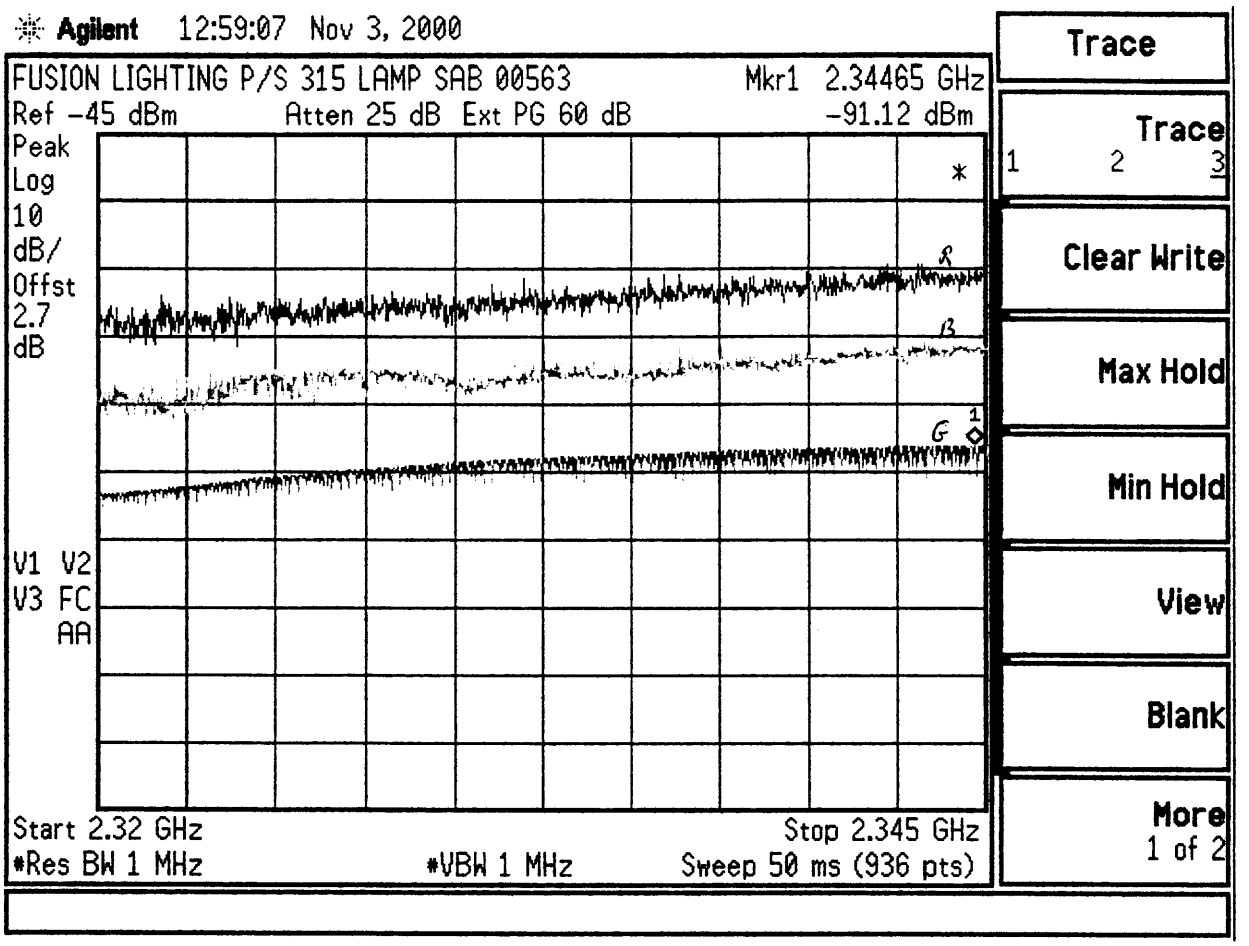
V 45°



240° G

90° V

270° B


Agilent 12:59:07 Nov 3, 2000
FUSION LIGHTING P/S 315 LAMP SAB 00563
Mkr1 2.34465 GHz
Ref -45 dBm
Atten 25 dB Ext PG 60 dB
-91.12 dBm
Peak
Log
10
dB/
Offst
2.7
dB
V1 V2
V3 FC
AA
Start 2.32 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 2.345 GHz
Sweep 50 ms (936 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2